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REMARKS

Claims 1-27 are currently pending in this application. By this amendment, claims 1, 3-7, 9-14, 16-18, 20-21 and 23-27 are amended and new claims 28-29 are added for the Examiner's consideration. Claims 2, 8, 15, 19 and 22 are cancelled without prejudice or disclaimer.

Applicants respectfully submit that the above amendments and added claims do not add new matter to the application and are fully supported by the original claims and the specification. For example, claim 6 has been amended to recite to bituminous coal having a "swell index of between about 3 to about 9." Support for amended claim 6 may be found on page 17, line 5 of the specification. Moreover, claims 10, 13, 24, and 27-29 have been amended to recite to a graphitizing temperature having the upper temperature limit of "3000°C." Support for these amendments may be found on page 16, line 19 of the specification.

In view of the above amendments and the following Remarks, Applicants respectfully request reconsideration and timely withdrawal of the pending objections and rejections for the reasons discussed below.

Preliminary Matters

A Petition for a three (3)-month extension of time under 37 C.F.R. § 1.136(a) and accompanying fee in the amount of \$ 475.00 is filed herewith extending the period for responding to the outstanding office action. Applicants believe that no further extensions of time are required other than those in the accompanying Petition. If extensions of time are necessary to prevent abandonment of this application, then such extensions of time are hereby petitioned for under 37 C.F.R. § 1.136(a). Any fees required for further extensions of time and any fees for the net addition of claims are hereby authorized to be charged to our Deposit Account No. 23-1951.

Objection to the Claims

In the Office Action, claims 16, 22 and 24 were objected to based upon lack of antecedent basis for a "coal-based carbon foam." Claims 16, 22 and 24 depend from independent claim 14. Claim 22 has been cancelled.

Independent claim 14 has been amended to recite to “coal-based carbon foam,” therefore providing the proper antecedent basis for the recitation of “coal-based carbon foam” in claim 24. Furthermore, claim 16 has been amended deleting the phrase “coal-based carbon foam.” This amendment is made for the sole purpose of clarification. This amendment is not made for the purpose of avoiding prior art or narrowing the claimed invention, and no change in claim scope is intended. Therefore Applicants do not intend to relinquish any subject matter by this amendment.

Applicants respectfully submit that claims 16 and 24, as amended, overcome the stated objection. Accordingly, Applicants respectfully request withdrawal of the objection for claims 16, 22 and 24.

Rejection under 35 U.S.C. § 102(e)

The Examiner has rejected claims 14-15 under 35 U.S.C. § 102(e) “as being anticipated by Reznek et al. U.S. Pub. 2002/0028385.” Office Action at page 2. Applicants respectfully traverse.

In particular, the Examiner alleges that Reznek discloses improving a fuel cell by using carbon foam as the fuel cell electrode. Applicants submit that Reznek is inadequate as an anticipatory reference because it fails to teach or suggest each and every element of the claimed invention. Claim 15, which depends from claim 14, has been cancelled. Amended claim 14 recites to carbon foam having “a density of in the range of about 0.1 g/cm³ to about 0.8 g/cm³.” Nowhere does Reznek teach or suggest carbon foam having this density.

Therefore, since Reznek fails to teach or suggest each and every element of the claimed invention, it is insufficient to maintain a rejection under 35 U.S.C. § 102(e). Accordingly, Applicants respectfully request reconsideration and withdrawal of the 35 U.S.C. § 102(e) rejection of claims 14-15.

Rejection under 35 U.S.C. § 102(e)

The Examiner has rejected claims 14 and 22 under 35 U.S.C. § 102(e) “as being anticipated by Droege al U.S. Patent 5,954,084.” *Id.* at page 3. Applicants respectfully traverse.

Applicants assert that the Droege '084 patent is inadequate as an anticipatory reference because it fails to teach or suggest each and every element of the claimed invention. Claim 22 which depends from claim 14 has been cancelled. Amended claim 14 recites to carbon foam "having a density in the range of about 0.1 g/cm³ to about 0.8 g/cm³" and "a thermal conductivity of below about 1 W/m/°K." Nowhere does the Droege '084 patent teach or suggest carbon foam having this combination of properties.

Therefore, since the Droege '084 patent fails to teach each and every element of the claimed invention, it is insufficient to maintain a rejection under 35 U.S.C. § 102(e). Accordingly, Applicants respectfully request reconsideration and withdrawal of the present rejection of claims 14 and 22 under 35 U.S.C. § 102(e).

Rejections under 35 U.S.C. § 103(a)

Claims 1 and 27 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Pub. No. 2002/0028385 issued to Reznick and U.S. Patent No. 5,945,084 issued to Droege. Applicants respectfully traverse.

Applicants assert that the Examiner has failed to establish a *prima facie* case of obviousness because the cited prior art references fail to teach or suggest each and every element of the claimed invention. The Examiner alleges that Reznick teaches "pyrolyzing coal (par. 44) to make carbon foam aerogel (par. 3) for use as fuel cell electrodes." *Id.* at page 4. Applicants assert that Reznick is inadequate as a primary reference because it fails to teach or suggest each and element of the claimed invention. Amended claim 1 recites to carbon foam having "a density in the range of about 0.1 g/cm³ to about 0.8 g/cm³," "a pore size below about 2000 μm," and "a thermal conductivity of below about 1 W/m/°K." Indeed, nowhere does Reznick teach or suggest these elements. Furthermore, as admitted by the Examiner, nowhere does Reznick teach or suggest the process for producing the green carbon foam as recited in claim 27. Therefore, Reznick neither teaches nor suggests all of the elements required in claim 1 and 27 of the instant invention.

Next, Droege is cited for teaching the "use of carbon foam electrode material in fuel cells primarily due to there high electrical conductivity." *Id.* Applicants assert that Droege is inadequate as a secondary reference because it fails to remedy the deficiencies of Reznick.

Nowhere does Droege teach or suggest carbon foam having the combined properties of “a density in the range of about 0.1 g/cm³ to about 0.8 g/cm³,” “a thermal conductivity of below about 1 W/m/°K,” and “a pore size below about 2000 μm.” Furthermore, nowhere does Droege teach or suggest the process for producing carbon foam as recited in claim 27. Therefore, neither Reznick nor Droege, singly or in combination, teach or suggest each and every element of the claimed invention.

Indeed, Applicants assert that the Examiner has failed to establish a *prima facie* obviousness rejection under 35 U.S.C. § 103(a). Accordingly, Applicants respectfully request reconsideration and withdrawal of the present rejection of claims 1 and 27.

Rejections under 35 U.S.C. § 103(a)

Claims 2-13, 16-21 and 23-27 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,888,469 issued to Stiller and U.S. Patent No. 5,945,084 issued to Droege. Applicants respectfully traverse.

Applicants assert that the Examiner has failed to establish a *prima facie* case of obviousness because the cited art references do not teach or suggest each and every element of the claimed invention. The Examiner alleges that Stiller teaches “a method of making an isotropic carbon foam by employing raw bituminous coal (abstract).” *Id.* Applicants assert that Stiller is inadequate as a primary reference because it fails to teach or suggest each and every element of the claimed invention.

Claims 2-13 depend from independent claim 1 and thus include all of the limitations of claim 1 by virtue of their dependency. Also, claims 16-21 and 23-27 depend from independent claim 14 and thus include all of the limitations of claim 14 by virtue of their dependency. Applicants assert that Stiller fails to teach or suggest each and every element of independent claims 1 and 14. Specifically, claims 1 and 14 recite to “at least one of said anode and said cathode comprises a coal-based carbon foam” and carbon foam having the combination of properties comprising “a pore size below about 2000 μm” and “a thermal conductivity of below about 1 W/m/°K.” Nowhere does Stiller teach or suggest such properties or uses of carbon foam. Therefore, since Stiller fails to teach each and every element of independent claims 1 and 14,

Stiller also fails to teach or suggest each and every element of dependent claims 2-13, 16-21 and 23-27.

Furthermore, with respect to dependant claims 13 and 27, Stiller is cited for allegedly teaching producing carbon foam from bituminous coal. Applicants assert that Stiller fails to teach or suggest each and every element of claims 13 and 27. Specifically, claims 13 and 27, which are directed to a process for producing carbon foam, recite the steps of “comminuting coal to a small particle to form a ground coal” and “heating said ground coal...to form an electrode preform.” Nowhere does Stiller teach or suggest directly heating ground coal to form an electrode preform. Unlike the presently claimed invention, Stiller teaches hydrogenating the bituminous coal using a solvent, such as tetrahydrofuran (THF), to remove inorganic matter from the coal prior to coking to produce the carbon foam. *See*, U.S. Patent No. 5,888,569 at column 3, line 65 to column 4, line 23 and column 5, lines 12-26. Therefore, nowhere does Stiller teach or suggest heating ground to form an electrode preform.

Next, Droege is cited for allegedly teaching carbon foams having a pore size of 2 nm to 50 nm to increase surface area. *Id.* at page 6. Applicants assert that Droege is inadequate as a secondary reference because it fails to remedy the deficiencies of Stiller. Nowhere does Droege teach or suggest carbon foam having the combination of properties comprising “a pore size below about 2000 μm ” and “a thermal conductivity of below about 1 W/m/ $^{\circ}\text{K}$.” Furthermore, nowhere does Droege teach or suggest the process for producing carbon foam as recited in claims 13 and 27. Therefore, neither Stiller nor Droege, singly or in combination, teach or suggest each and every element of the claimed invention.

Indeed, Applicants assert that the Examiner has failed to establish a *prima facie* obviousness rejection under 35 U.S.C. § 103(a). Accordingly, Applicants respectfully request reconsideration and withdrawal of the present rejection of claims 2-13, 16-21 and 23-27.

Added Claims

Added claims 28 and 29 are directed to fuel cells and electrical cells, respectively, employing carbon foam as either the anode and/or cathode produced by heating bituminous ground coal under a non-oxidizing atmosphere and heating to a temperature of between about 300°C to about 700°C from about 10 minutes to about 12 hours, controllably cooling the carbon

foam and then graphitizing the carbon foam. The newly added claims are directed to additional aspects of the invention, which are not disclosed or suggested in the prior art. Therefore newly added claims 28 and 29 are allowable for reasons similar to the instant claims of the present invention.

CONCLUSION

Applicants submit that a full and complete response has been made to the pending Office Action and respectfully submit that all of the stated objections and grounds for rejection have been overcome or rendered moot. Accordingly, Applicants respectfully submit that all pending claims are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is thus respectfully requested to pass the above application to issue.

Should the Examiner feel that there are any issues outstanding after consideration of this response; the Examiner is invited to contact the Applicants' undersigned representative at the number below to expedite prosecution. Prompt and favorable consideration of this Reply is respectfully requested. Applicants respectfully request that a timely Notice of Allowance be issued for this application.

Respectfully submitted,



Philip D. Lane
Reg. No. 41,140

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McGuireWoods LLP
1750 Tysons Boulevard
Suite 1800
McLean, VA 22102-4215
Tel: 703-712-5069
Fax: 703-712-5296

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